

WHAT IS CLAIMED IS:

1 1. A VLAN tagging unit having multiple logical interfaces, different logical
2 interfaces on the VLAN tagging unit being associated with different customer
3 networks, the customer networks transmitting data to the VLAN tagging unit
4 across a WAN, the VLAN tagging unit producing a VLAN ID for data associated
5 with a customer network, the production of the VLAN ID depending at least
6 partially on the logical interface of the VLAN tagging unit on which the data is
7 received, the VLAN tagging unit using the VLAN ID to produce VLAN frames to
8 sent to additional network elements.

1 2. The VLAN tagging unit of Claim 1 wherein one logical interface
2 comprises a physical port.

1 3. The VLAN tagging unit of Claim 2 wherein one logical interface
2 comprises a T1 port.

1 4. The VLAN tagging unit of claim 1, wherein one logical interface
2 comprises a DS3, CT3 or E1 port.

1 5. The VLAN tagging unit of Claim 2 wherein at least one logical
2 interface comprises an Ethernet port.

1 6. The VLAN tagging unit of Claim 1 wherein at least one logical
2 interface comprises a portion of a physical port.

1 7. The VLAN tagging unit of Claim 6 wherein the portion of the
2 physical port comprises a fractional T1.

1 15. The system of Claim 1 wherein the VLAN ID depends upon other
2 information such that multiple VLAN IDs can be used for data received at the same
3 logical interface.

1 16. The VLAN tagging unit of Claim 1 wherein only the logical
2 interface is used to determine the tagged VLAN ID.

1 17. The VLAN tagging unit of Claim 1 further includes a VLAN table
2 associating VLAN IDs and associated logical interfaces.

1 18. The system of Claim 1 wherein when data associated with a
2 VLAN ID is received it is forwarded to each of the associated logical interfaces
3 other than the logical interface on which the data is received.

1 19. The VLAN tagging unit of Claim 1 wherein service parameters
2 are further associated with the VLAN IDs, the service parameter affecting data
3 passing through the VLAN tagging unit.

1 20. The VLAN tagging unit of Claim 1 wherein data from multiple
2 VLAN having different VLAN IDs are sent across the same WAN connection,
3 with a quality of service indication determining how the bandwidth is divided
4 between the VLANs, the quality of service indication associated with a VLAN ID.

1 21. The VLAN tagging unit of Claim 1 further comprising network
2 address translation for IP addresses based on VLAN ID.

1 22. The VLAN tagging unit of Claim 1 wherein at least one VLAN
2 ID is a management ID that allows the management of network elements such that
3 elements associated with other VLAN IDs cannot access the management function.

1 23. The VLAN tagging unit of Claim 1 wherein the VLAN tagging
2 unit is adapted to associate flows coming to the unit into separate VLAN IDs such
3 that elements in at least one network portion can handle the flows differently.

1 24. The VLAN tagging unit of Claim 1 wherein the VLAN tagging
2 unit has a VLAN table of VLAN IDs and associated logical interfaces, the VLAN
3 table being dynamically updated during operation of the VLAN tagging unit.

1 25. A VLAN tagging unit having multiple logical interfaces, different
2 logical interfaces on the VLAN tagging unit being associated with different
3 customer networks, the customer networks transmitting data to the VLAN tagging
4 unit across a WAN, the VLAN tagging unit producing a VLAN ID for data
5 associated with a customer network, the production of the VLAN ID depending at
6 least partially on the logical interface of the VLAN tagging unit on which the data
7 is received, the VLAN ID further depending upon other information such that
8 multiple VLAN IDs can be used for data received at the same logical interface, the
9 VLAN tagging unit using the VLAN ID to produce VLAN frames to sent to
10 additional network elements.

1 26. The VLAN tagging unit of Claim 25 wherein at least one logical
2 interface comprises a multi-link of T1s.

1 27. The VLAN tagging unit of Claim 25 wherein in at least one
2 logical interface comprises an Ethernet port.

1 28. The VLAN tagging unit of Claim 25 wherein at least one logical
2 interface comprises a T1 port.

3 29. The VLAN tagging unit of claim 25, wherein at least one logical
4 interface comprises a DS3, CT3 or E1 port.

1 30. The VLAN tagging unit of Claim 25 wherein the customer
2 networks are not associated into VLANs.

1 31. The VLAN tagging unit of Claim 25 wherein the customer
2 networks are associated into VLANs having VLAN IDs.

1 32. The VLAN tagging unit of Claim 31 wherein another VLAN
2 tagging unit strips the VLAN header from the data from the customer network
3 before transmitting the data from the another VLAN tagging unit to the first VLAN
4 tagging unit.

1 33. The VLAN tagging unit of Claim 25 wherein the VLAN tagging
2 unit has a VLAN table associating VLAN IDs with logical interfaces and other
3 information.

1 34. The VLAN tagging unit of Claim 25 wherein service parameters
2 are associated with VLAN IDs and the units are adapted to use the service
3 parameter to affect data passing through the unit based upon the VLAN IDs.

1 35. The VLAN tagging unit of Claim 25 wherein the quality of
2 service is determined based upon the VLAN IDs.

1 36. The VLAN tagging unit of Claim 25 wherein the VLAN tagging
2 unit further does network address translation based on VLAN IDs.

1 37. The VLAN tagging unit of Claim 25 wherein at least one VLAN
2 ID is used for management.

1 38. The VLAN tagging unit of Claim 25 wherein the VLAN tagging
2 unit is adapted to associate flows coming through the Internet with separate VLAN
3 IDs such that the elements in at least one network portion can handle the flows
4 differently.

1 39. The VLAN tagging unit of Claim 25 wherein the VLAN tagging
2 unit has a VLAN table of VLAN IDs and associated logical interfaces, and the
3 VLAN table is dynamically updated during the operation of the unit.

1 40. A system comprising:
2 a customer network using a first VLAN ID;
3 a first VLAN tagging unit, the first VLAN tagging unit adapted to convert
4 VLAN frames into data in a format without a VLAN ID which is sent across a
5 WAN to a second VLAN tagging unit; and
6 the second VLAN tagging unit adapted to receive data in the format without
7 a VLAN ID, the second VLAN tagging unit converting the data in the format
8 without a VLAN ID into VLAN frames with a second VLAN ID, wherein the first
9 and second VLAN ID need not be the same.

1 41. The system of Claim 40 wherein data is sent between the first and
2 second VLAN tagging unit as datalink layer encapsulated IP packet.

1 42. The system of Claim 41 wherein the data link connection is a
2 point to point protocol packet.

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58. The unit of Claim 54 wherein the logical interfaces include at least one Ethernet port.

59. The unit of Claim 54 wherein the unit further keeps track of service parameters that affects the data transferred over the WAN.

60. The unit of Claim 54 wherein the one of the service parameters comprises a quality of service indication.

61. The unit of Claim 54 wherein network address translation is done based on VLAN IDs across the WAN.

62. The unit of Claim 54 wherein one VLAN ID is reserved for management.

63. The unit of Claim 54 wherein units associate flows coming to the unit with separate VLAN IDs so that elements in at least one VLAN network portion can handle the flows differently.

64. The unit of Claim 54 wherein the VLAN table is dynamically updated.

65. An unit associated with customer networks and with at least one WAN, different logical interfaces on the unit being associated with different customer networks, the unit allowing transfer of data associated with a VLAN across a WAN, the unit maintaining a VLAN table of VLAN IDs, logical interfaces associated with each VLAN ID, and at least one associated service

6 parameter, wherein based at least partially on the VLAN ID the unit is adapted to
7 use the service parameter to affect data passing through the unit.

1 66. The unit of Claim 65 wherein the service parameter comprises a
2 quality of service parameter.

1 67. The unit of Claim 65 wherein the service parameter indicates a
2 translation.

1 68. The unit of Claim 65 wherein the service parameter indicates a
2 compression.

1 69. The unit of Claim 65 wherein the service parameter indicates an
2 encapsulation.

1 70. The unit of Claim 65 wherein the service parameter indicates an
2 encryption.

1 71. The unit of Claim 65 wherein the logical interfaces in one
2 embodiment includes a multi-link of multiple T1s.

1 72. The unit of Claim 65 wherein network address translation is done
2 based upon the VLAN ID.

1 73. The unit of Claim 65 wherein one VLAN ID is maintained for
2 management.

1 74. The unit of Claim 65 wherein flows coming to the unit are tagged
2 with different VLAN IDs so that VLAN elements can handle flows differently.

1 75. The unit of Claim 65 wherein the VLAN table is dynamically
2 updated.

1 76. A unit associated with at least one WAN, different logical
2 interfaces on the unit being associated with different customer networks, the unit
3 allowing transfer of data associated with a VLAN across the WAN, the unit
4 maintaining a table of VLAN IDs and at least one associated quality of service
5 indication, wherein data from multiple VLANs having different VLAN IDs are
6 sent across the same WAN connection with the quality of service indication
7 determining how bandwidth is divided between the VLANs.

1 77. The unit of Claim 76 wherein the quality of service indications
2 includes a committed information rate indication.

1 78. The unit of Claim 77 wherein the quality of service indication
2 further includes a burst rate indication.

1 79. The unit of Claim 76 wherein the quality of service indication
2 further includes a shape indication.

1 80. The system of Claim 76 wherein the unit further includes a
2 policing indication to indicate how the unit policies the quality of service allocated
3 to a VLAN.

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1 81. The unit of Claim 76 wherein the unit prioritizes data sent based
2 upon the VLAN ID.

1 82. A unit associated with customer networks and with at least one
2 WAN, different logical interfaces on the unit being associated with different
3 customer networks, the unit maintaining a table of VLAN IDs and associated
4 logical interfaces, the VLAN Table also containing IP addresses associated with the
5 different logical interfaces such that network address translation of IP addresses is
6 done at least in part due to the logical interface on the unit from which data is
7 received.

1 83. The unit of Claim 82 wherein the unit data transmits data from the
2 unit to the WAN and the unit strips away the VLAN ID and transmits non-VLAN
3 ID data to another unit across the WAN.

1 84. The unit of Claim 82 wherein the network address translation
2 comprises IP Version 4 to IP Version 6 address translation.

1 85. A network including at least one network portion including
2 elements supporting VLANs, the at least one network portion including an unit
3 operably connected to a WAN, the unit including a VLAN table associating VLAN
4 IDs and logical interfaces of the unit, wherein the unit receives data from the WAN
5 and converts the data to a VLAN frame format including VLAN IDs, wherein at
6 least one VLAN ID is a management ID that allows the management of network
7 elements such that elements associated with other VLAN IDs cannot access the
8 management functions.

1 86. The network of Claim 85 wherein connectivity is checked based
2 upon the VLAN ID.

1 87. The network of Claim 85 wherein the unit converts non-VLAN
2 management instructions to VLAN ID-based management instructions.

1 88. A network including at least one network portion including
2 elements supporting VLANs, the at least one network portion including an unit
3 operably connected to a WAN, the unit including a VLAN table associating VLAN
4 IDs and logical interfaces of the unit, wherein the unit receives data from the WAN
5 and converts the data to a VLAN frame format including VLAN IDs, wherein the
6 unit is adapted to associate flows coming to the unit with separate VLAN IDs such
7 that elements in the at least one network portion can handle the flows differently.

1 89. The network of Claim 88 wherein the association of flows is done
2 based upon a group.

1 90. The network of Claim 88 wherein which the flows are tagged
2 based upon TCP port.

1 91. The system of Claim 88 wherein the flows are tagged based upon
2 UDP port.

1 92. The system of Claim 88 wherein the flows are tagged based upon
2 designation IP address.

1 93. The system of Claim 88 in which the flows are tagged based upon
2 source IP address.

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1 100. The system of Claim 97 in which VLAN table data is dynamically
2 obtained from other units having VLAN tables.